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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/064,283	06/28/2002	Norman Arnold Turnquist	121251	4427

6147 7590 01/31/2008
GENERAL ELECTRIC COMPANY
GLOBAL RESEARCH
PATENT DOCKET RM. BLDG. K1-4A59
NISKAYUNA, NY 12309

EXAMINER

PATEL, VISHAL A

ART UNIT	PAPER NUMBER
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3676

NOTIFICATION DATE	DELIVERY MODE
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01/31/2008

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte NORMAN ARNOLD TURNQUIST,
THOMAS MARTIN ANGELIU,
PETER LOUIS ANDERSON,
MARK EDWARD BURNETT,
and FREDERICK GEORGE BAILY

Appeal 2007-4242
Application 10/064,283
Technology Center 3600

Decided: January 29, 2008

Before CATHERINE Q. TIMM, JEFFREY T. SMITH, and
LINDA M. GAUDETTE, *Administrative Patent Judges*.

GAUDETTE, *Administrative Patent Judge*.

DECISION ON APPEAL

1 This is an appeal from the final rejection of claims 1-18, the only claims pending in the application. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

The invention relates to a brush seal having improved wear characteristics at low temperatures and pressures. (Br. 2). In an exemplary embodiment, the bristles of the brush seal comprise Hastelloy® C-276, sold by Haynes International. Spec. [0010]. Claims 1, 6, and 16 are illustrative of the invention and are reproduced below:

1. A brush seal, disposed in a section of a steam turbine, for reducing leakage of a working fluid across a pressure drop, said brush seal comprising:

a bristle holder attachable to said steam turbine; and

a plurality of bristles coupled to said bristle holder, said plurality of bristles comprising Ni, Cr, Mo, Fe, W, Mn, V, Si, and C.

6. A brush seal, disposed in a section of a steam turbine, for reducing leakage of a working fluid across a pressure drop, said brush seal comprising:

a bristle holder attachable to said steam turbine; and

a plurality of bristles coupled to said bristle holder, said plurality of bristles comprising a low radiation activation material, said material having less than 2.5% Cobalt by weight.

16. A method of retrofitting a steam turbine comprising:

providing a stator; said stator disposed in said steam turbine;

providing a rotor, said rotor spaced apart from said stator so as to define a gap therebetween; and

providing a brush seal, said brush seal being disposable in a section of said steam turbine,

wherein said brush seal comprises a plurality of bristles having about 16% Cr, about 16% Mo, about 5% Fe, about 4% W, less than about 2.5% Co, about 1% Mn, about 0.35% V, about 0.08 Si, about 0.01 % C and a remainder of Ni.

The Examiner relies on the following prior art references to show unpatentability:

Modell	US 5,252,224	Oct. 12, 1993
Basu	US 5,884,918	Mar. 23, 1999

Hastelloy® C-276 alloy Product Brochure

The Examiner made the following rejections:

1. Claims 1-18 under 35 U.S.C. § 103(a) as unpatentable over Basu.
2. Claims 1-18 under 35 U.S.C. § 103(a) as unpatentable over Basu in view of Modell.

Rejection of claims 1-18 under 35 U.S.C. § 103 as unpatentable over Basu

The Examiner finds that Basu discloses the invention as claimed with the exception of the bristle composition. (Ans. 3-4). The Examiner maintains that Basu discloses bristles made from nickel alloys which are art recognized equivalents of Hastelloy® C-276. (Ans. 4 (citing Modell)). The Examiner contends that it would have been obvious to one having ordinary skill in the art at the time the invention was made to have used the claimed bristle composition (Hastelloy® C-276) in Basu's brush seal device, "since

it has been held to be within the general skill of a worker in the art to select a know[n] material on the basis of its suitability for the intended use as a matter of obvious design choice.” (Ans. 4).

Appellants contend that the Examiner fails to establish a prima facie showing of obviousness. Appellants maintain that the Examiner has not provided evidence that Hastelloy® C-276 and other Ni-based alloys are “art equivalent in general or art equivalent with respect to brush seals in particular.” (Reply Br. 1). Appellants argue that Modell relates to cleaning bristles, not sealing bristles. (Reply Br. 1). Thus, Modell does not provide evidence that Hastelloy® C-276, i.e., the material used for Modell’s cleaning bristles, is an art recognized equivalent material for sealing bristles. (Br. 6).

Based on the contentions of the Appellants and the Examiner, the issue presented is: Has the Examiner established that Hastelloy® C-276 is an art recognized equivalent of the sealing brush bristle materials disclosed in Basu? We answer this question in the negative.

Basu discloses “[a] brush seal device for sealing a high pressure area from a low pressure area.” (Abstract). According to Basu, “[t]o retain their shape, especially at higher temperatures, bristles 64 preferably comprise a high temperature nickel-based alloy such as Haynes 25® or Haynes 214®¹ manufactured by Haynes International or ceramic materials such as silicon

¹ We note that Haynes 214® appears to meet the limitation of the claim 6 low radiation activation material having less than 2.5% Cobalt by weight. Haynes 214® contains 75% Ni, 16% Cr, 4.5% Al, 3% Fe, 0.5% Mn, 0.2% Si, 0.1% Zr, 0.05% C, 0.01% B, and 0.01% Y. See <http://www.haynesintl.com/HTAlloys.htm>

carbide.” (Basu, col. 5, ll. 17-21). Hastelloy® C-276 is a corrosion resistant alloy containing about 57% Ni, 16% Cr, 16% Mo, 5% Fe, 4% W, 2.5% Co, 1% Mn, 0.35% V, 0.08% Si, and 0.01%C. (Hastelloy® C-276 Product Brochure).

We are in agreement with Appellants that the Examiner has not provided sufficient evidence or explanation to support a finding that Hastelloy® C-276 is an art recognized equivalent of the alloys used for Basu’s sealing brush bristles. The Examiner has not explained why one ordinary skill in the art would have concluded that a corrosion resistant alloy such as Hastelloy® C-276 would be a suitable substitute for Basu’s conventional high temperature alloy sealing brush bristle materials (*see* Spec. [0013] stating that it was known in the art at the time of the invention to utilize Haynes 25® for the brush seal bristle material in sections of steam turbines operating at temperatures between 500 and 1100 °F). Likewise, the Examiner’s general reliance on Modell does not provide sufficient support for a finding of equivalence, since the Examiner has neither directed us to the specific, relied-upon portions of Modell nor otherwise explained how Modell supports this finding. *See In re Ahlert*, 424 F.2d 1088, 1091 (CCPA 1970) ("Assertions of technical facts in areas of esoteric technology must always be supported by citation of some reference work" and "[a]llegations concerning specific 'knowledge' of the prior art, which might be peculiar to a particular art should also be supported.").

Accordingly, we find that the Examiner failed to establish that claims 1-18 are prima facie obviousness in view of Basu.

Rejection of claims 1-18 under 35 U.S.C. § 103 as unpatentable over Basu in view of Modell

The Examiner finds that Basu discloses the invention as claimed with the exception of the bristle composition. (Ans. 4). The Examiner further finds that Modell discloses a brush having bristles made of Inconel® 625 (a nickel alloy) or Hastelloy® C-276. (Ans. 4). The Examiner contends that it would have been obvious to have used Hastelloy® C-276 for the bristles of Basu's sealing brush as taught by Modell since nickel alloys are considered art equivalents when used for bristles and because the resultant bristles would have better integrity. (Ans. 5 (citing Modell, col. 14, l. 47)).

Appellants argue that Modell relates to cleaning brushes and, therefore, is non-analogous art. (Br. 6-7; Reply Br. 2). Appellants also argue that one of ordinary skill in the art would not have had a reasonable expectation of success in using Modell's cleaning bristles in a sealing brush context. (Br. 7).

Accordingly, the issue presented is: Has the Examiner provided a reasonable basis for combining the teachings of Basu and Modell in the manner claimed? We answer this question in the affirmative. Therefore, an additional issue presented is: Does the evidence relied on by Appellants in support of nonobviousness outweigh the Examiner's evidence of obviousness? We answer this question in the negative.

Modell discloses a method and apparatus for oxidation of aqueous mixtures of organic material, including toxic material in the presence of inorganic materials, by reaction of the material with water and oxygen at supercritical conditions. (Abstract). Modell's apparatus includes a solids removal system 120, whereby solids which collect along tubular reactor 12

are removed periodically by directing a brush 122 through the length of tubular reactor 12. (Modell, col. 12, ll. 8-14). One embodiment of the invention utilizes an "on-line cleaning method" in which brush 122 is directed through tubular reactor 12 while continuing oxidation of the reaction mixture within reaction system 10. (Modell, col. 12, ll. 34-38). On-line cleaning is commenced by diverting the flow of feed material. (Modell, col. 12, ll. 64-68). "During this diversion, brush 122 is carried along with the feed material into tubular reactor 12, wherein the reaction mixture provides the motive force for carrying brush 122 through and out of tubular reactor 12. The flow of reaction mixture around and through brush 122 exerts a force on brush 122 sufficient to carry it into and through tubular reactor 12." (Modell, col. 13, ll. 1-7).

"A reference is reasonably pertinent if, even though it may be in a different field from that of the inventor's endeavor, it is one which, because of the matter with which it deals, logically would have commended itself to an inventor's attention in considering his problem." *In re Clay*, 966 F.2d 656, 659 (Fed.Cir.1992). In other words, "familiar items may have obvious uses beyond their primary purposes." *KSR Int'l Co. v. Teleflex, Inc.*, 127 S.Ct. 1727, 1742 (2007).

* * *

"[A]ny need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed."
Id.

In re ICON Health and Fitness, Inc., 496 F.3d 1374, 1379-80 (Fed. Cir. 2007).

Contrary to Appellants' contention, we find that the Examiner provided a reasonable basis to conclude that one of ordinary skill in the art at the time of the invention would have been motivated to consider Modell in designing an improved sealing brush. Although Modell is not related to sealing brushes per se, Modell is concerned with a problem common to both sealing and cleaning brushes, i.e., degradation/loss of integrity in pressurized reaction environments. *Compare* Spec [0003] and Basu, col. 5, ll. 17-21 with Modell, col. 14, ll. 41-48.

We further find that the Examiner properly determined that one of ordinary skill in the art would have had a reasonable expectation of success in using the material of Modell's cleaning brush bristles, i.e., Hastelloy® C-276, for the bristles of Basu's sealing brush. Basu discloses that various components of their sealing brush, e.g., the front, retaining, and back plates, may comprise a nickel based alloy such as Inconel® 625 or 718. (Basu, col. 7, ll. 34-38). Although Basu discloses that the bristles preferably comprise a high temperature nickel-based alloy such as Haynes 25® or Haynes 214®, Basu also teaches that sealing brush "bristles 64 may comprise any suitable material for a particular application." (Basu, col. 5, ll. 21-22).

Modell discusses appropriate materials for use in reaction environments where good corrosion resistance is required at maximum operating temperatures of 550 and 650 °C. (Modell, col. 8, ll. 21-23). These materials include Hastelloy® C-276 and Inconel® 625, respectively. (Modell, col. 9, ll. 58-65). As noted by the Examiner (Ans. 5), Modell teaches that the integrity of a cleaning brush at the operating temperature of the reaction system may be preserved by constructing the entire brush from the same material used for the reactor and specifically identifies both

Inconel® 625 and Hastelloy® C-276 as suitable materials for the brush bristles. (Modell, col. 14, ll. 41-48). Thus, in our view, the Examiner reasonably concluded that one of ordinary skill in the art would have been motivated to construct Basu's sealing brush bristles from the same materials used by Basu for other sealing brush components, e.g., Inconel® 625, or an equivalent material, e.g., Hastelloy® C-276, depending on the particular operating conditions of the reactor, as taught by Modell. *See KSR*, 127 S. Ct. at 1739 (prima facie case of obviousness is established where the Examiner demonstrates that the invention is nothing more than the predictable result of a combination of familiar elements according to known methods).

We note that Appellants indicate that the following groups of claims stand or fall together: (a) claims 1-5 and 11-15, (b) claims 6-10, and (c) claims 16-18. However, Appellants have not explained, with any degree of specificity, how the limitations of any particular claim within each of these three groupings patentably distinguish over the Examiner's proposed combination. *See* 37 C.F.R. § 41.37(c)(1)(vii) ("A statement which merely points out what a claim recites will not be considered an argument for separate patentability of the claim."). In any event, because Appellants do not dispute the Examiner's finding that Basu discloses the invention as claimed with the exception of the sealing brush bristle material, and having concluded that the Examiner properly established that it would have been obvious to have used Hastelloy® C-276 (which meets the limitations of the brush seal composition recited in independent claims 1, 6, and 16) for Basu's sealing brush bristles, we conclude that the Examiner established a

prima facie showing of obviousness as to each of the three claim groupings in view of the combined teachings of Basu and Modell.

A prima facie case of obviousness may be rebutted by evidence of unexpected results or a showing that the prior art teaches away from the claimed invention in any material respect. *In re Geisler*, 116 F.3d 1465, 1469-70 (Fed. Cir. 1997). Appellants contend that the comparative data in the Specification provides evidence that the claimed invention provides unexpected results. (Br. 5). We do not find this evidence persuasive in overcoming the Examiner's prima facie showing of obviousness. Appellants have not established that the claimed invention was compared with the closest prior art. For example, the Specification indicates that the results show an improvement "compared to traditional labyrinth-type seals that are typically used in low-pressure steam turbine applications." (Spec. [0016]). However, Appellants have not identified what materials are used in these prior art seals, as such, we do not know whether these materials, in fact, represent the closest prior art. In addition, we note that the testing is not commensurate in scope with at least claims 6 and 16. Only one brush seal composition was tested, i.e., a brush seal comprising about 15% Cr, 16% Mo, 5% Fe, 3.1% W, 1.7% Co, 0.46%, Mn, 0.1 5% V, about 0.08 Si, about 0.01% C, and 56% Ni. (Spec. [0015]). However claim 16 does not contain ranges and claim 6 broadly recites a low radiation activation material having less than 2.5% Cobalt by weight. *See In re Harris*, 409 F.3d 1339, 1344 (Fed. Cir. 2005); *see also, In re Costello*, 480 F.2d 894, 897 (CCPA 1973).

ORDER

The Examiner's decision rejecting claims 1-18 under 35 U.S.C. § 103 as unpatentable over Basu alone is reversed. The Examiner's decision rejection claims 1-18 under 35 U.S.C. § 103 as unpatentable over Basu in view of Modell is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(i)(iv).

AFFIRMED

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